MEA 2010–2011

Science Grade 5

The table below shows the entire fifth grade science test design. Scores are based on common items only, half of which are released and can be found in this document.

Test Design

Content Area	Common		Field Test Items		Total Items per Student		Base Testing Time	Points
	MC	CR	MC	CR	MC	CR		
Science	32	4	8	1	40	5	90 min.	48

Each item on the MEA measures a content standard of Maine's 2007 *Learning Results*.

Science Content Standards Assessed on the MEA

D. The Physical Setting
1. Universe and Solar System
2. Earth
3. Matter and Energy
4. Force and Motion

E. The Living Environment
1. Biodiversity
2. Ecosystems
3. Cells
4. Heredity and Reproduction
5. Evolution

Item Information Chart

Please refer to the item information chart on the next page for in-depth information on each science released item. The released item numbers in the chart correspond to item numbers in the practice test and on the MEA Item Analysis Report.

Constructed-Response Scoring Guides

A constructed-response scoring guide includes score point descriptions used to determine the score. Training notes that follow the scoring guide provide in-depth descriptions or particular information also used to determine the score.

Student Work

At least one sample student response is provided for each score point with annotations that explain the reasoning behind the assigned score.

Grade 5 Science Released Item Information

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Practice Test Page Number	1	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	7	7
Content Strand (Maine 2007 Learning Results)	E3	E4	D3	D2	D4	E5	E2	D1	D3	E5	D4	D3	E2	D2	E4	E2	E1	D2
Depth of Knowledge Code	1	1	2	2	2	2	2	2	2	3	2	2	1	2	2	2	2	2
Item Type	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	CR	CR
Possible Points	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4
Answer Key	B	A	B	D	D	D	A	C	D	B	D	A	B	D	C	B		
% Who Chose A or Earned 1 Point	8	83	22	18	12	21	80	6	14	6	7	76	15	9	18	4	7	36
% Who Chose B or Earned 2 Points	67	5	52	3	7	15	3	36	22	88	5	8	69	4	2	81	26	32
% Who Chose C or Earned 3 Points	19	1	22	9	25	7	3	56	18	3	16	10	2	4	61	4	44	12
% Who Chose D or Earned 4 Points	5	10	4	70	55	57	14	1	45	3	72	5	14	82	19	11	22	4
Statewide Average Student Score																	2.77	1.51

Content Strands: See "MDOE Regulation 132—Learning Results: Parameters for Essential Instruction" at http://www.maine.gov/education/lres/pei/index.html.

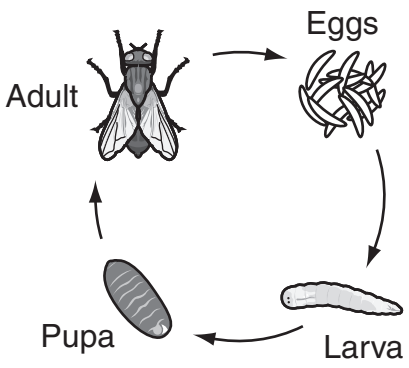
Item Type: MC = multiple-choice, CR = constructed-response

Answer Key: the letter of the correct answer choice

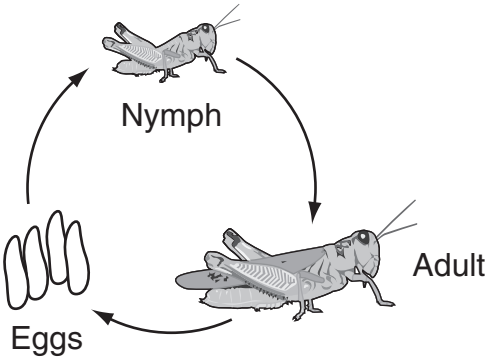
Constructed-Response Item 17

17 Two different insect life cycles are shown below.

Housefly Life Cycle



Grasshopper Life Cycle



a. Describe **two** ways the housefly's life cycle is like the grasshopper's life cycle.

b. Describe **two** ways the housefly's life cycle is different from the grasshopper's life cycle.

Be sure to label parts a and b in your answer booklet.

Scoring Guide for Constructed-Response Item 17

Score	Description
4	The response demonstrates a thorough understanding of the changes in external features of an organism during its life cycle. The response gives two detailed explanations of how the housefly's and grasshopper's life cycles are alike and different. The response has no errors or omissions.
3	The response demonstrates a general understanding of the changes in external features of an organism during its life cycle. The response has an error or omission.
2	The response demonstrates a limited understanding of the changes in external features of an organism during its life cycle. The response has errors and omissions.
1	The response demonstrates a minimal understanding of the changes in external features of an organism during its life cycle. The response has several errors and omissions.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Training Notes for Constructed-Response Item 17

a. Likenesses

- Both insects have an egg stage.
- The adult insects lay the eggs.
- Both insects molt as they grow and develop.
- Young insects do not reproduce.
- Both adults have wings.
- Both insects have no wings as young insects.
- Both young are left alone to develop (no parental help).

b. Differences

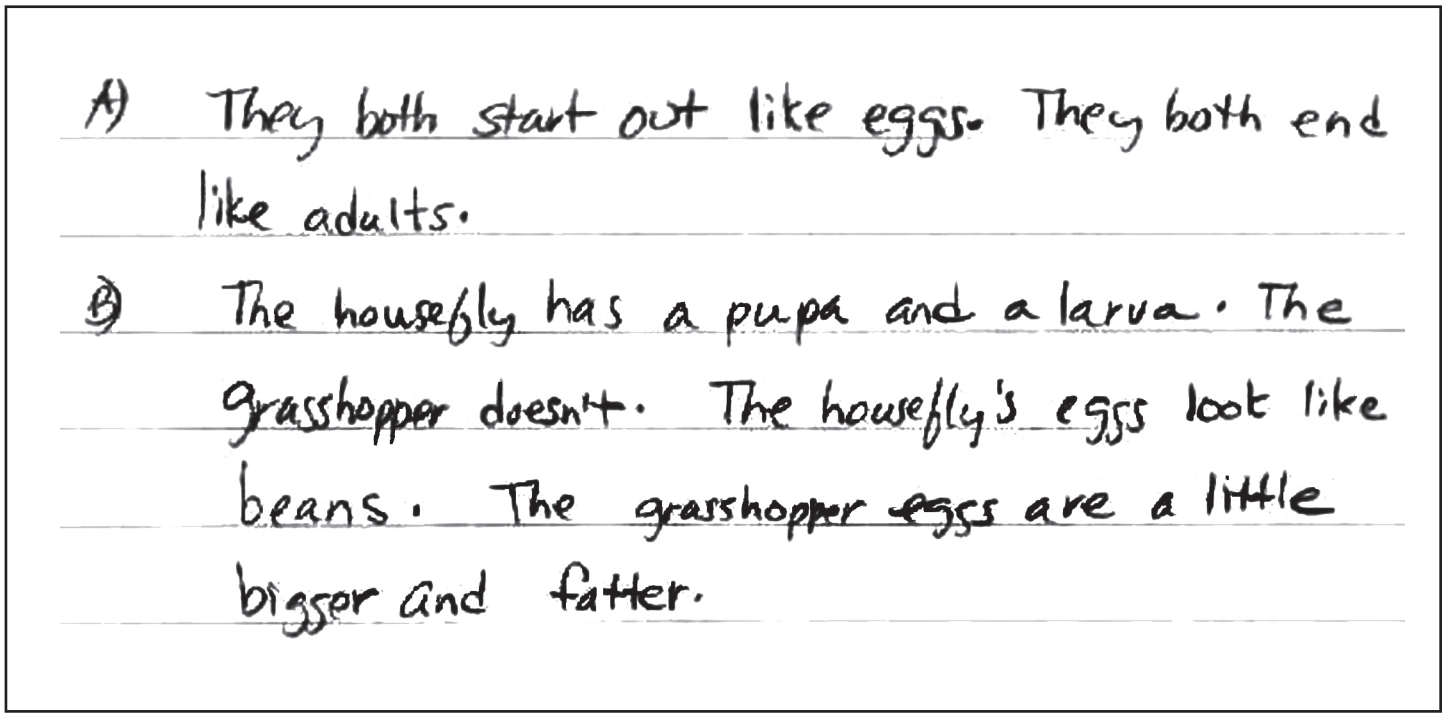
- The fly has four stages of development; the grasshopper has three.
- Young grasshopper looks like the adult; young fly looks like a worm.
- The fly has a pupa and larva stage, not so in the grasshopper.
- The adult and young flies eat different things.
- The adult and young grasshopper eat the same things.
- The flies lay more eggs, and the eggs are laid on food.
- Adult flies can move from place to place; larval flies stay in one location.

- The young flies have no legs.
- The grasshopper eggs are larger, fewer, and found in soil.
- Eggs of the grasshopper and fly are a different shape and size.

Note: Using terms (like *grow*, *fly*, and *reproduce*) that are common to all or many organisms are not accepted for a score of 4.

Points — 2 points for both parts (a) and (b)

Sample 4-Point Response with Annotations for Constructed-Response Item 17

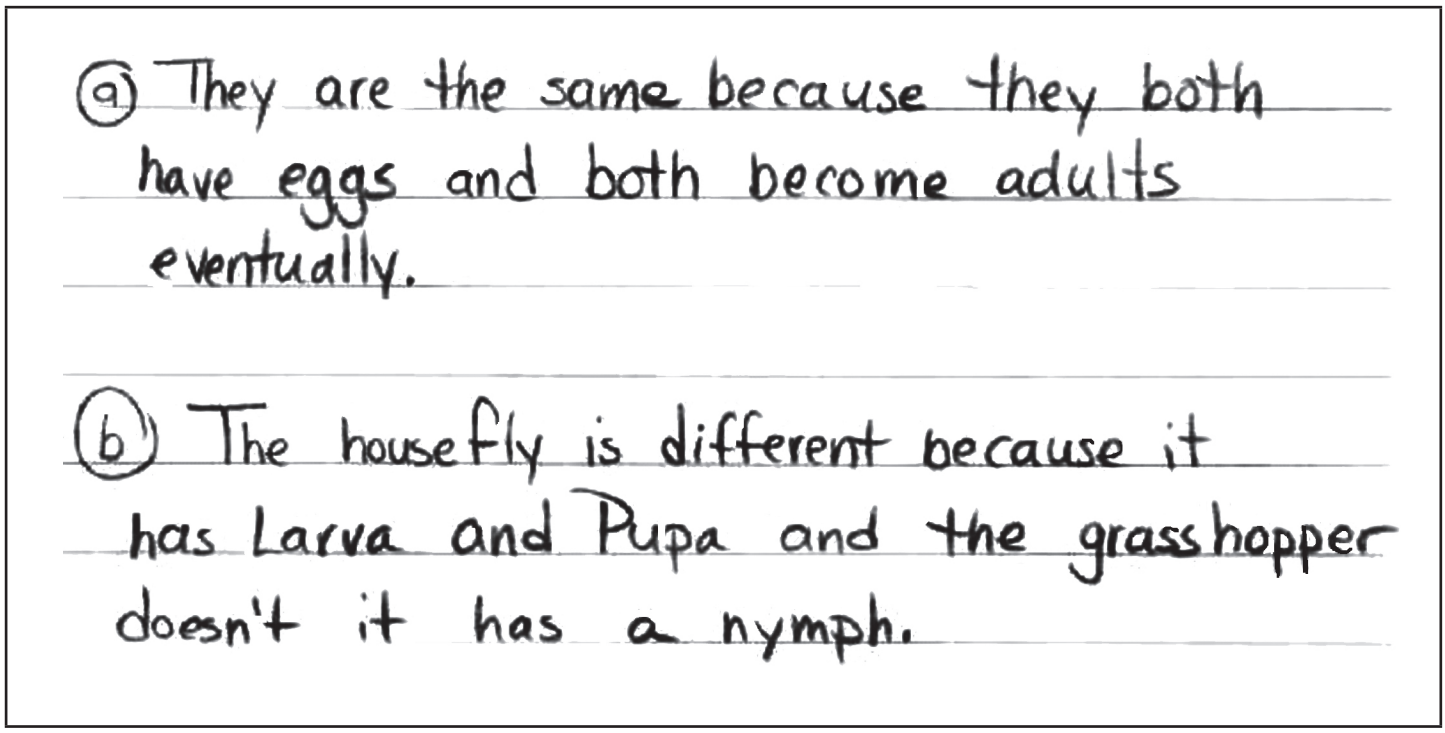

A) They both start out like eggs. They both end like adults.

B) The housefly has a pupa and a larva. The grasshopper doesn't. The housefly's eggs look like beans. The grasshopper eggs are a little bigger and fatter.

Summary annotation statement:

The response describes two ways that the housefly's life cycle is like the grasshopper's life cycle: "both start out like eggs" and "end like adults." The response then correctly describes two differences: "housefly has a pupa and a larva" stage, which is different for the grasshopper, and the egg shapes are different, "housefly's eggs look like beans," and the grasshopper eggs are a "little bigger and fatter." The response expresses a thorough understanding and receives a score of 4.

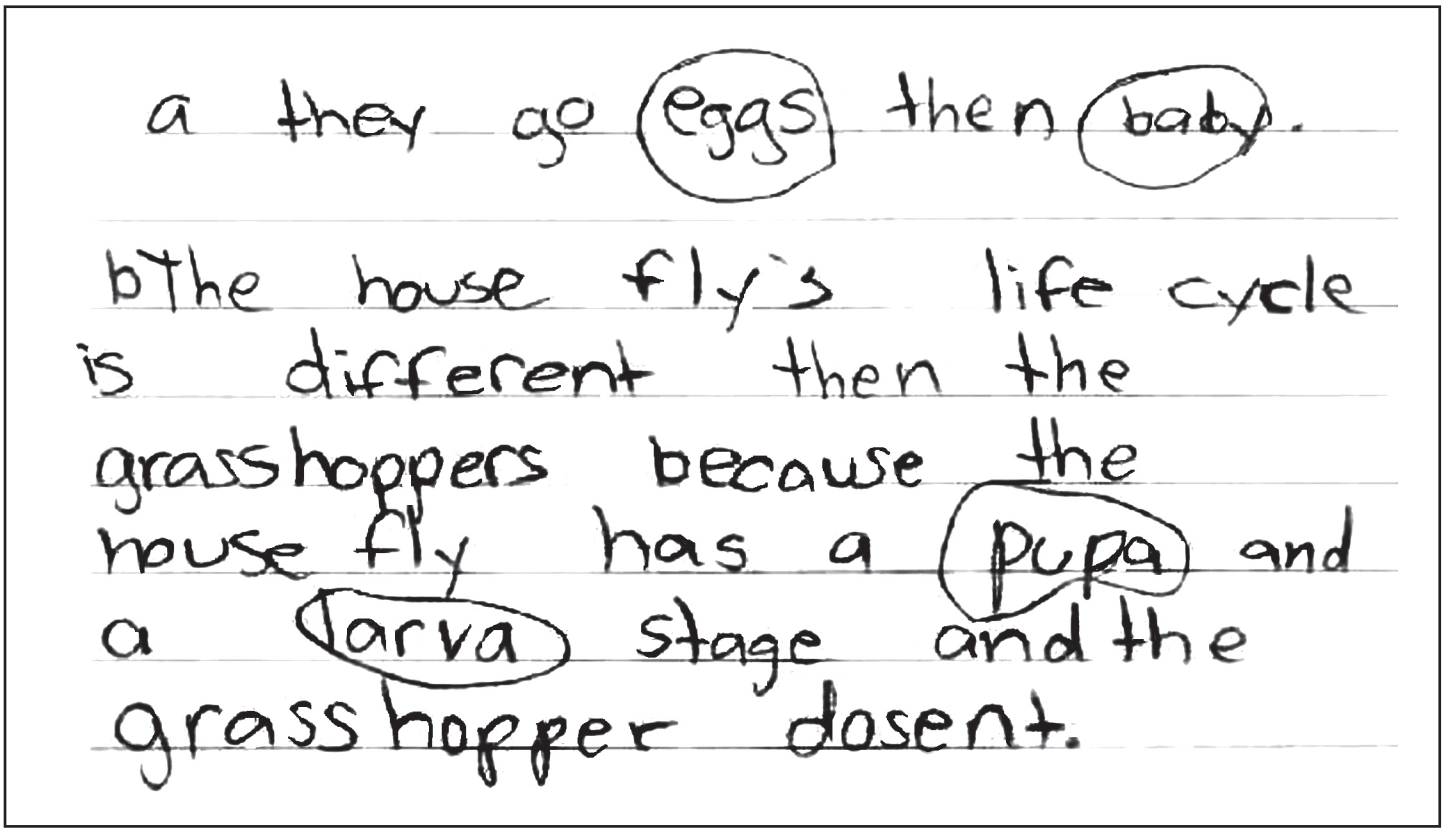
Sample 3-Point Response with Annotations for Constructed-Response Item 17



Summary annotation statement:

The response describes two ways that the housefly's life cycle is like the grasshopper's life cycle: "they both have eggs" and "both become adults eventually." The response then describes one valid difference: "housefly is different because it has larva and pupa and the grasshopper doesn't it has a nymph." The response is considered general and receives a score of 3.

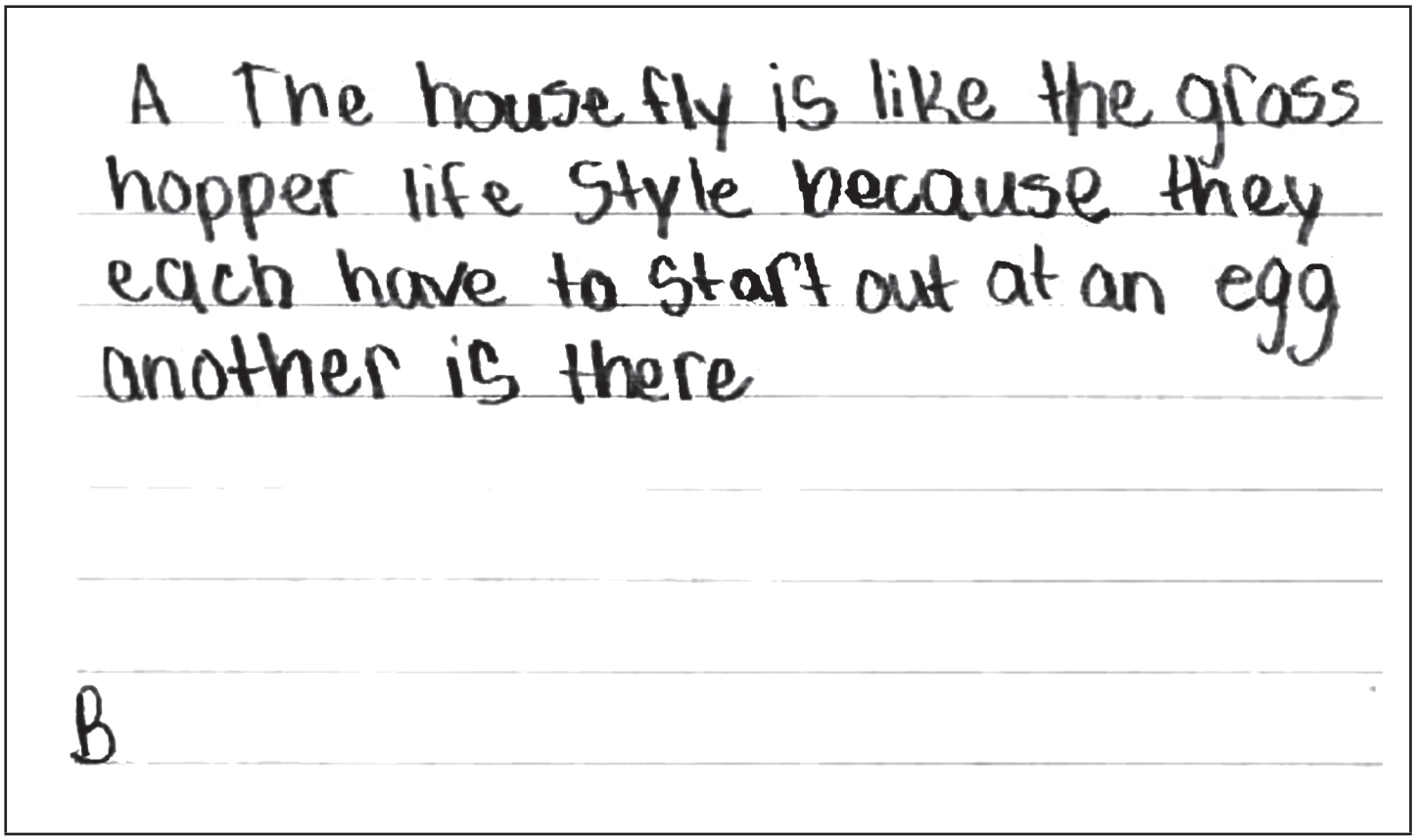
Sample 2-Point Response with Annotations for Constructed-Response Item 17



Summary annotation statement:

The response includes one way that the housefly's life cycle is like the grasshopper's life cycle: "eggs." "Baby" does not receive credit as it is too vague. The response then describes one difference: "house fly [housefly] has a pupa and a larva stage and the grasshopper dosent [doesn't]." For these reasons the response is considered limited and receives a score of 2.

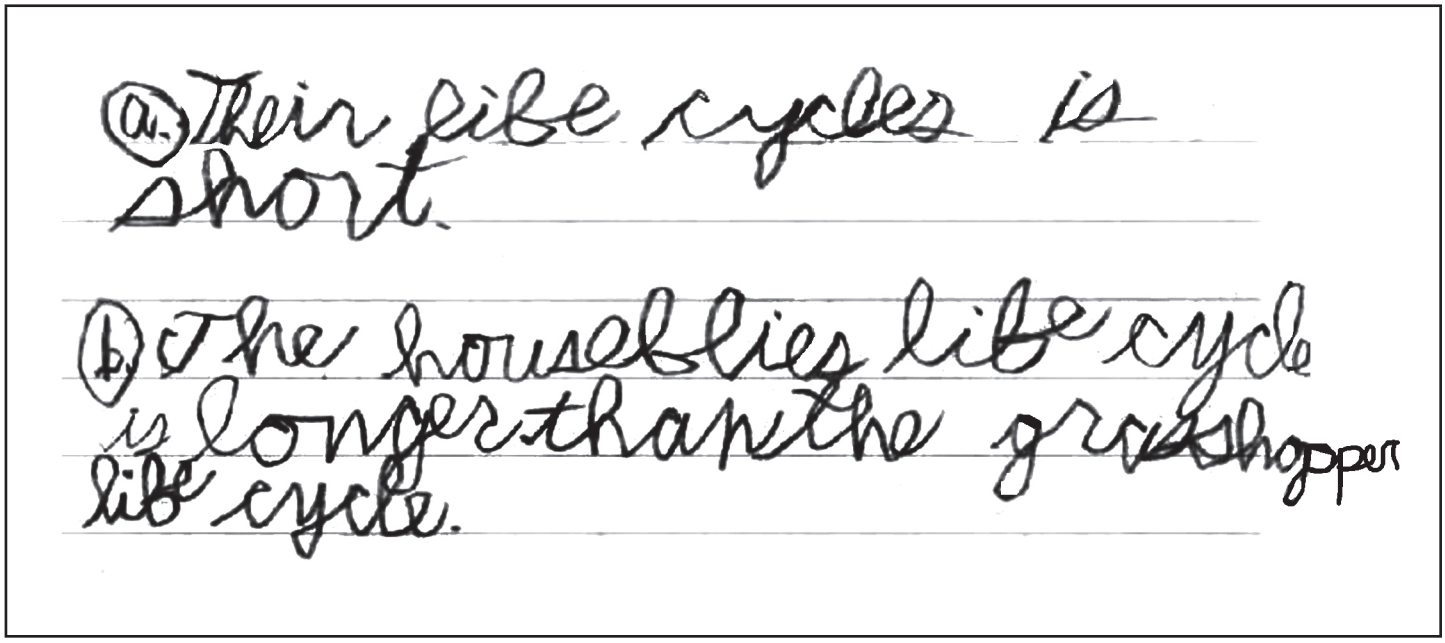
Sample 1-Point Response with Annotations for Constructed-Response Item 17



Summary annotation statement:

The response includes one way that the housefly's life cycle is like the grasshopper's life cycle: "start out at [as] an egg." All other elements are omitted. This is considered a minimal response and receives a score of 1.

Sample 0-Point Response with Annotations for Constructed-Response Item 17



Summary annotation statement:

The response does not describe a way that the housefly's life cycle is like the grasshopper's life cycle. The response includes "the houseflies life cycle is longer than the grasshopper life cycle," which does not receive credit. Although there are more stages in the life cycle of the housefly, the time it takes for a grasshopper to progress through the stages takes longer than the housefly. The response is too vague and contains no elements worth credit and receives a score of 0.

Constructed-Response Item 18

18 a. Explain why Earth has day and night.

b. Explain how the cycle of day and night affects temperature on Earth.

Be sure to label parts a and b in your answer booklet.

Scoring Guide for Constructed-Response Item 18

Score	Description
4	The response demonstrates a thorough understanding of the cycle of day and night. The response correctly states the reason for occurrence of day and night alternatively and the effect on temperature due to this cycle in days and nights. Response has no errors or omissions.
3	The response demonstrates a general understanding of the cycle of day and night. The response has an error or omission.
2	The response demonstrates a limited understanding of the cycle of day and night. The response has two errors or omissions.
1	The response demonstrates a minimal understanding of the cycle of day and night. The response has one correct piece of information.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

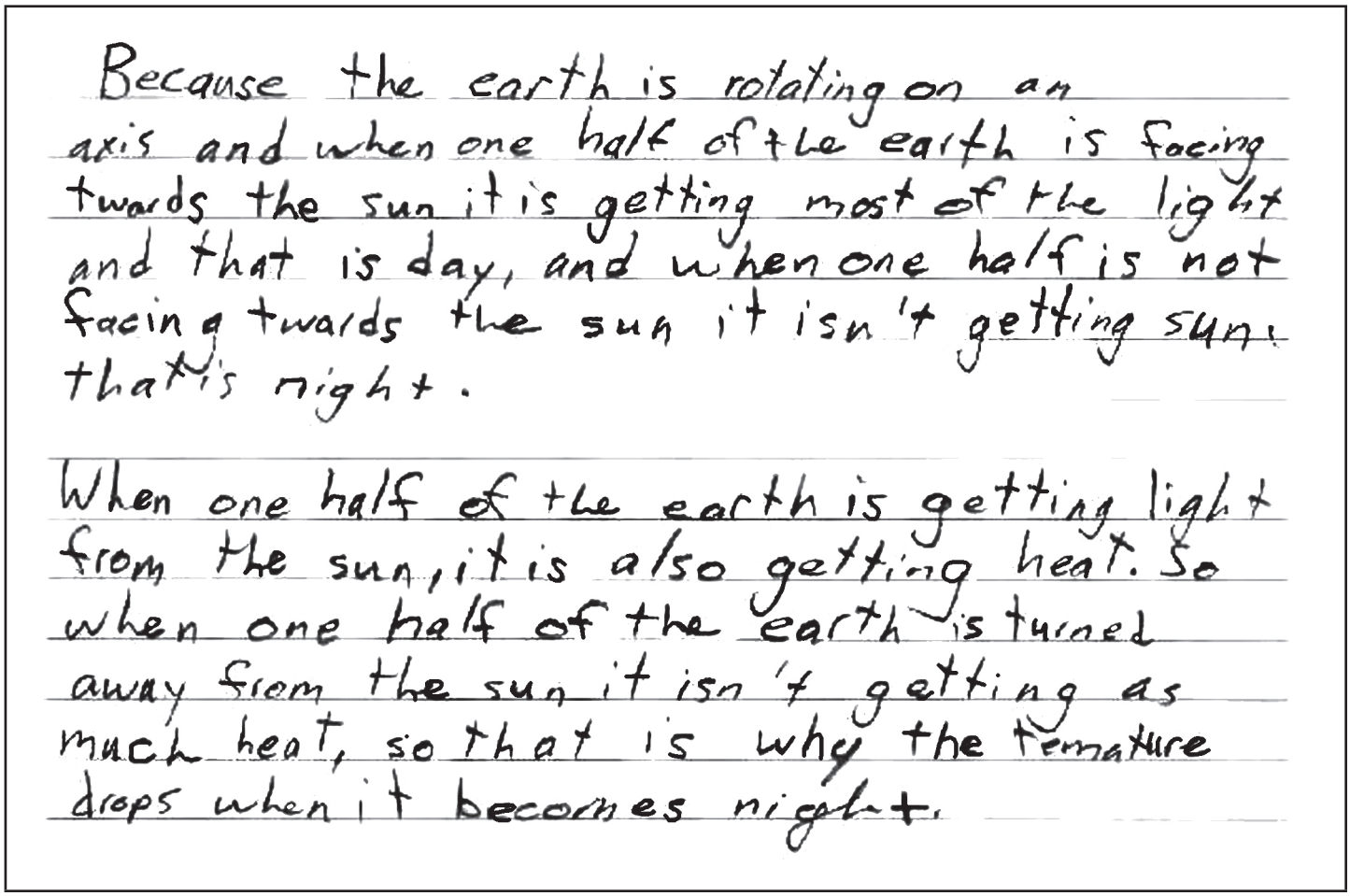
Training Notes for Constructed-Response Item 18

a. Earth rotates (spins on its axis). This causes different parts of Earth to face the Sun. The part of Earth facing the Sun has day, while the other half not facing the Sun has night. As Earth rotates (spins on its axis), the part that has night begins to face the Sun, and the cycle of day and night continues.

b. Sunlight carries heat energy. Thus the part of Earth facing the Sun during daytime becomes hot, and the temperature on this part of Earth rises. During night, the part of Earth that does not face the Sun does not receive sunlight and hence becomes cooler than it is during the day.

Each part is 2 points.

Sample 4-Point Response with Annotations for Constructed-Response Item 18

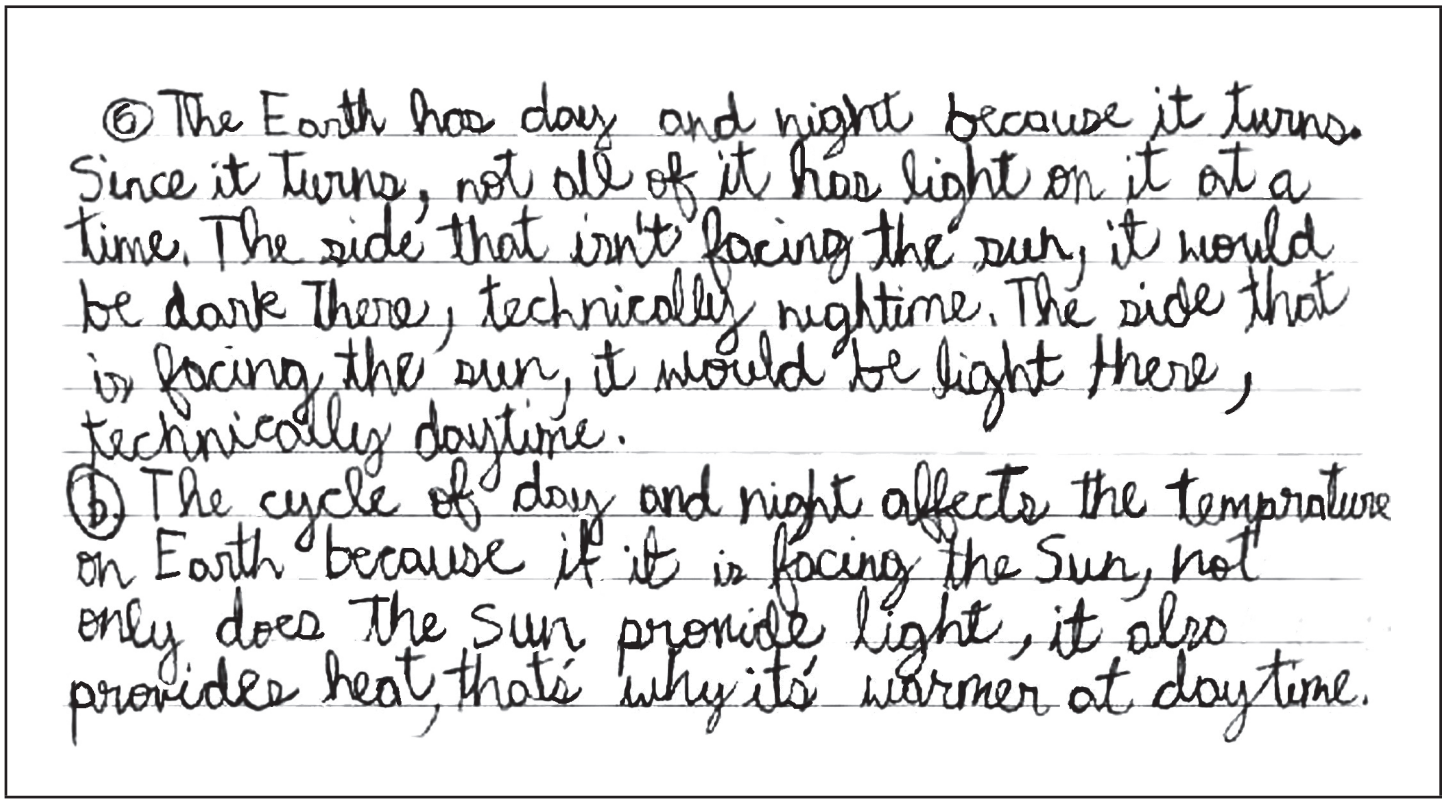

Because the earth is rotating on an axis and when one half of the earth is facing twards the sun it is getting most of the light and that is day, and when one half is not facing twards the sun it isn't getting sun. that is night.

When one half of the earth is getting light from the sun, it is also getting heat. So when one half of the earth is turned away from the sun it isn't getting as much heat, so that is why the temature drops when it becomes night.

Summary annotation statement:

The response identifies that Earth is rotating on its axis and further describes this as "when one half… is facing twards [towards] the sun it is getting most of the light and that is day" and "when one half is not facing twards [towards] the sun…that is night." The response then correctly identifies that sunlight carries heat energy, "when one half of the earth is getting light from the sun, it is also getting heat" and "when one half…is turned away…it isn't getting as much heat, so…the temature [temperature] drops when it becomes night." The response expresses a thorough understanding of the cycle of day and night as well as the effect on temperature due to this cycle and receives a score of 4.

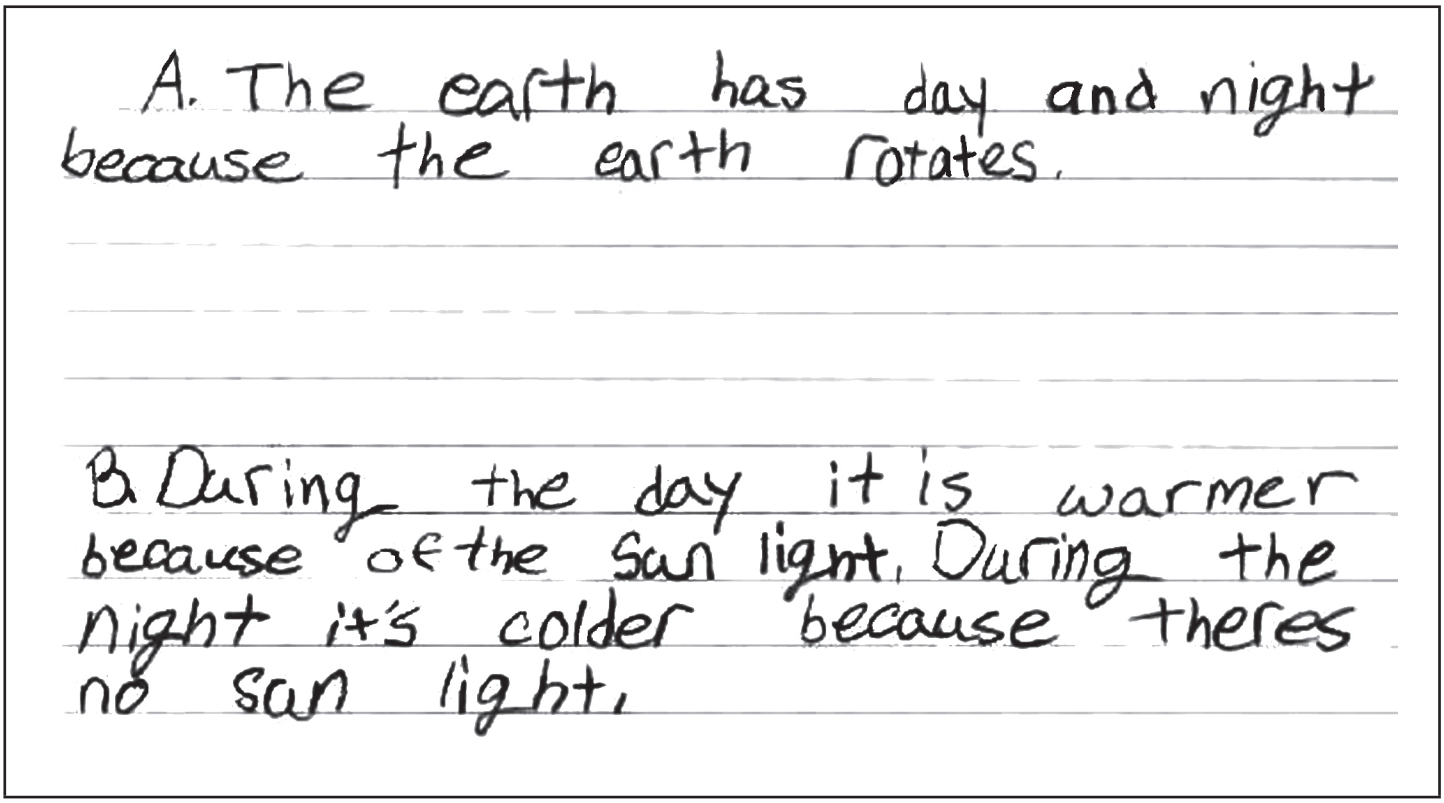
Sample 3-Point Response with Annotations for Constructed-Response Item 18



Summary annotation statement:

The response identifies that Earth rotates, "turns" on its axis, and further describes "the side that isn't facing the sun…would be dark…technically nighttime [nighttime]" and "the side that is facing the sun… daytime." The response then correctly identifies that sunlight carries heat energy: "if it [one side of Earth] is facing the sun, not only does the sun provide light, it also provides heat." The response "warmer at daytime" does not provide enough to be considered a clear explanation of the effect at night. The response is considered general and receives a score of 3.

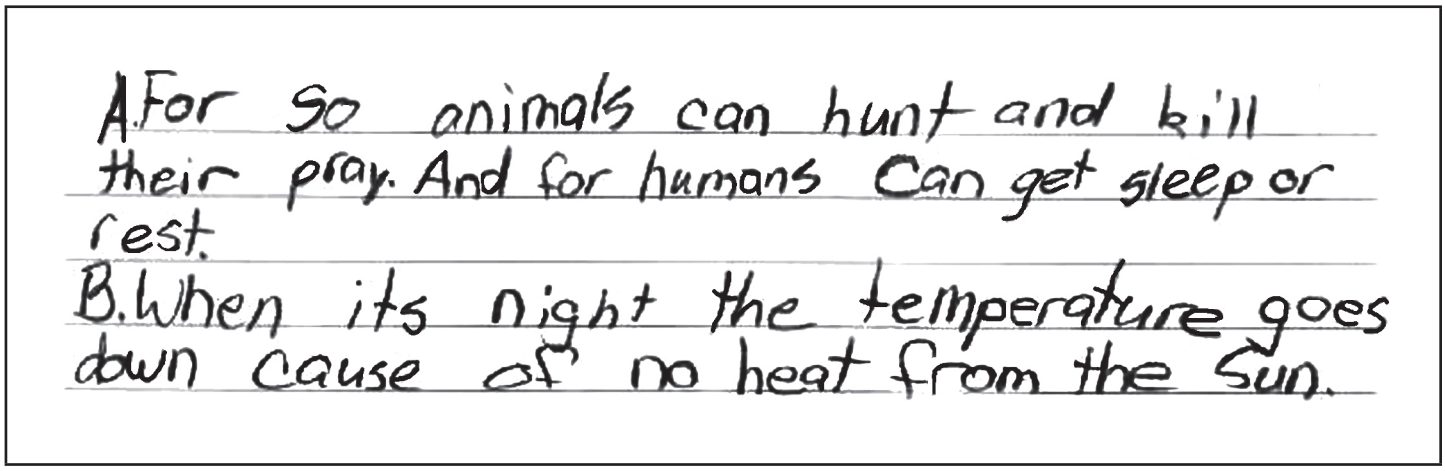
Sample 2-Point Response with Annotations for Constructed-Response Item 18



Summary annotation statement:

The response identifies that Earth "rotates" but lacks details to explain what happens when it rotates on its axis. The response then vaguely identifies that sunlight carries heat energy because "it is warmer because of the sun light" and includes "[d]uring the night it's colder because theres [there's] no sun light." For these reasons the response is considered limited and receives a score of 2.

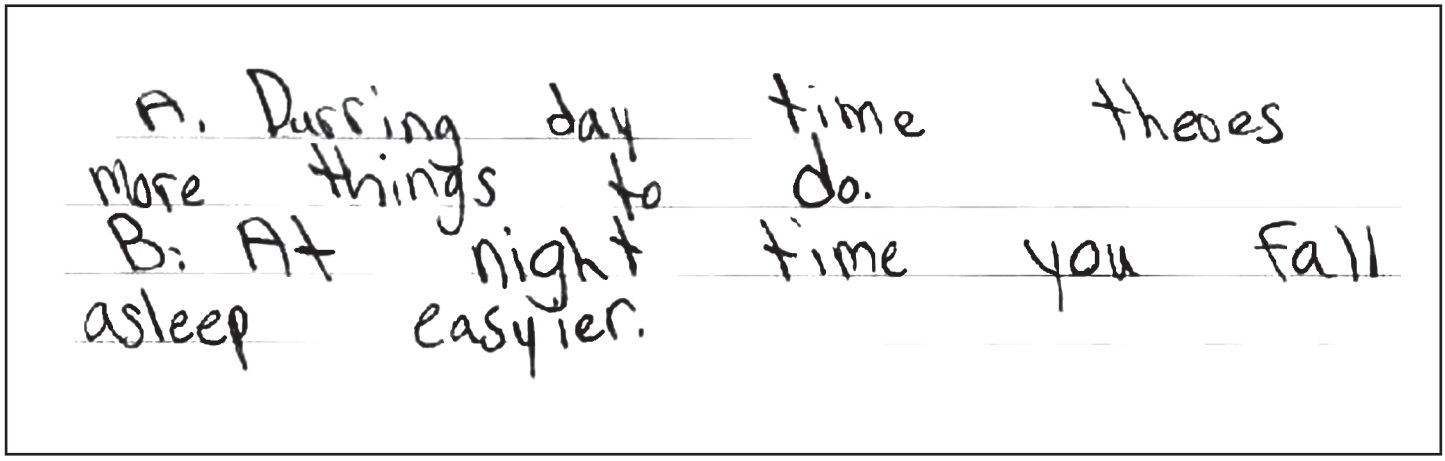
Sample 1-Point Response with Annotations for Constructed-Response Item 18


A. For so animals can hunt and kill their pray. And for humans Can get sleep or rest.
B. When its night the temperature goes down cause of no heat from the Sun.

Summary annotation statement:

The response vaguely identifies that sunlight carries heat energy because "when its night the temperature goes down…no heat from the sun." All other elements are omitted. This is considered a minimal response and receives a score of 1.

Sample 0-Point Response with Annotations for Constructed-Response Item 18



Summary annotation statement:

The response contains no elements worth credit and receives a score of 0.